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AUTHOR	West, Jerry
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ABSTRACT

Data from the postsecondary transcripts of high school seniors included in the High School and Beyond (HS&B) study of the class of 1980 and the National Longitudinal Study (NLS) of the Senior Class of 1972 were analyzed to investigate the participation of students in two-year postsecondary programs. The analyses focused mainly on the characteristics of students who received an associate degree or certificate in a vocational education program within 4 years of high school graduation. Study findings included the following: (1) only 12% of the HS&B graduates who attended any postsecondary institution completed a vocational degree or certificate program; (2) among the 1980 high school seniors who completed a postsecondary program within 4 years of high school graduation, vocational credentials were earned at a rate four times that of academic degrees; (3) HS&B students completed vocational degrees at a higher rate than NLS students, but academic degrees at a lower rate; (4) most associate vocational degrees were completed at public two year colleges; (5) the most popular field of study for vocational program graduates was business, followed by technical and engineering studies and health for associate degree recipients, and trade and industry and health for certificate completers; (6) 40% of all credits earned by vocational degree completers were in academic subjects; (7) students with certificates earned slightly more than half as many credits as students completing vocational degree programs; and (8) the postsecondary credit patterns for those who completed vocational certificate programs and those who completed academic degree programs did not change much between the early to middle 1970's and the early to middle 1980's. Technical notes, data tables, and a classification of postsecondary courses are included in the report. (JMC)

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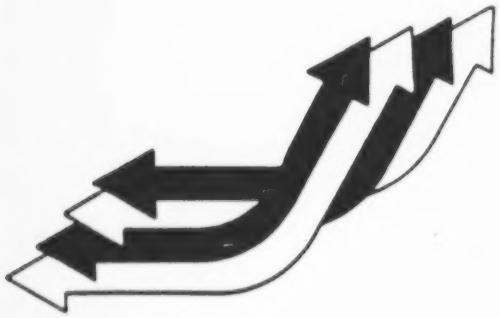
NATIONAL CENTER FOR EDUCATION STATISTICS

Survey Report

April 1989

The Postsecondary Vocational Education of 1980 High School Seniors: The Two–Year Associate of Arts Degree

Jerry West
Crosscutting Education Statistics and Analysis Division



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Contact:
Jerry West
(202) 357–6574

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Highlights

Data from the postsecondary transcript components of the High School and Beyond (HS&B) senior cohort and the National Longitudinal Study of the Senior Class of 1972 studies were analyzed to determine the participation of students in 2-year postsecondary education programs. The analyses focused mainly on the characteristics of postsecondary vocational education completers, defined as those students who received a vocational Associate of Arts (A.A.) degree or a certificate. Because of the periodicity of the HS&B survey, the analyses were limited to those individuals who completed a postsecondary education program within 4 years of high school graduation.

Some of the major findings of the analyses are highlighted below.

Postsecondary Vocational Education Program Completers

- The rate at which those surveyed completed their vocational credentials within the first 4 years following high school graduation was low: only 12 percent of 1980 high school graduates with any postsecondary education completed a vocational A.A. degree or certificate program within this time period.

- Among the 1980 high school seniors who completed a postsecondary program within 4 years of high school graduation, vocational credentials were earned at a rate four times that of academic A.A. degrees.

- The completion rate for vocational A.A. degrees was two-and-one-half times that of academic A.A. degrees.

- The percentage of high school graduates in 1980 who completed a vocational A.A. degree program within 4 years of high school was higher than the percentage of 1972 high school graduates who completed a similar program. The reverse was true with respect to completion of academic A.A. degree programs.

- Most vocational A.A. degrees were received from public 2-year colleges, although about 20 percent of the students earned A.A. degrees in vocational areas from 4-year colleges.

- Six out of every 10 vocational certificate completers earned their credentials from private schools which do not grant bachelor's degrees.

- The types of postsecondary institutions students attended and the kinds of postsecondary credentials they received were related to family socioeconomic factors. Students from the highest status families were more likely to attend 4-year colleges and to earn bachelor's degrees, while those from lower status families were more likely to attend public 2-year colleges and to receive pre-bachelor's vocational credentials.

- Students who participated in a high school vocational program and students whose educational aspirations while in high school did not include 4-year college attendance were more likely to attend public 2-year colleges and private, non-bachelor's degree-granting schools than 4-year colleges. The former students were more likely to complete a vocational credential within 4 years of high school graduation than were academic students and 4-year college aspirants.

Postsecondary Vocational A.A. Degree and Certificate Completers

- The most popular field of study for vocational A.A. degree and certificate completers alike was business. Roughly one-third of A.A. and certificate completers earned their credentials in business.

- The second and third most popular fields of study for vocational A.A. degree recipients were: technical and engineering studies; and health. Among certificate completers, trade and industry was the second most popular field of study, followed by health.

- There were pervasive differences between men and women in the areas in which their studies were concentrated. Men were more likely than women to earn A.A. degrees and certificates in technical and engineering programs, while women were more likely than men to complete A.A. degree and certificate programs in business and health.

- Overall, two-fifths of all credits earned by vocational A.A. degree recipients were in academic subjects, suggesting that the vocational A.A. degree is not, in general, a narrowly defined program.

- Students with certificates received a little more than one-half as many credits as students completing vocational A.A. degree programs; they also took fewer courses in ancillary vocational areas and fewer academic courses.

- On average, students who earned academic A.A. degrees received about three-quarters of their credits in academic courses and nearly one-quarter of their credits in vocational courses.

- High school graduates in 1980 who completed a vocational A.A. degree program received more credits in vocational subjects than did 1972 high school graduates; however, they earned about the same number of credits in their major area.

- The postsecondary credit patterns for those who completed vocational certificate programs and those who completed academic A.A. degree programs have not changed much between the early to middle 1970s and the early to middle 1980s.

Foreword

This report describes the postsecondary education experiences of 1980 and 1972 high school seniors through the first 4 years following graduation. The report concentrates on those students who complete vocational credentials within this time period and describes their characteristics. It uses information from two National Center for Education Statistics (NCES) longitudinal data bases: "National Longitudinal Study of the High School Class of 1972" (NLS-72); and "High School and Beyond" (HS&B). Both studies gathered transcripts directly from the postsecondary institutions attended by the student participants. This report focuses on these postsecondary transcript data files.

The data analyzed for this report are available for secondary analyses. Information about obtaining NLS-72 and HS&B computer tapes is available from the U.S. Department of Education, Office of Educational Research and Improvement, Information Technology Branch, 555 New Jersey Avenue NW, Room 214A, Capitol Place Building, Washington, DC 20208-1327.

Jeanne Griffith, Director
Crosscutting Education Statistics
and Analysis Division
National Center for Education
Statistics
Office of Educational Research
and Improvement

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Introduction

Over the past 2 decades, enrollments in 2-year postsecondary institutions have increased substantially more than enrollments in 4-year institutions.[1] Between 1970 and 1986, enrollments in 2-year public institutions grew by more than 110 percent while there was a 20 percent increase in enrollments in 4-year public institutions. Private 2-year and 4-year college enrollments also increased over this same period, but the rate of increase was slower.

One consequence of the growing enrollments in 2-year institutions has been a large increase in the number of Associate of Arts (A.A) degree awards. Postsecondary institutions awarded about 80 percent more A.A. degrees in 1985 than in 1971.[2] Much of this increase has come at the community college level and in vocational rather than academic programs. Community colleges have expanded more rapidly than any other level of postsecondary education, and a large part of this expansion has come in vocational programs with as much as 75 percent of all coursework now in vocational areas.[3]

As the number of A.A. degree awards in vocational areas has increased, the number of academic A.A. degree awards--the traditional credential from 2-year colleges for students wishing access to a baccalaureate degree program--has declined.[4] Between 1974 and 1982, the number of A.A. degrees in the arts and sciences declined by about 3 percent, while vocational A.A. degrees grew by more than 50 percent; academic A.A. degrees slipped from 48 percent of all A.A. degrees in 1974 to 37 percent in 1982.[5]

While the overall trends in A.A. degree awards are relatively clear, the data necessary to document carefully the extent and pattern of pre-baccalaureate postsecondary education have been unavailable or fragmented. For example, there has been a lack of information about the specific subjects studied by students who complete A.A. degree programs, the intensity of their course-taking, the duration of their program of study, and other basic aspects of their postsecondary education. Aside from information on gender and race, little has been known about the characteristics of A.A. degree recipients. As a result, discussions about the nature of pre-baccalaureate postsecondary education have been relatively uninformed, during a period when this level of education has grown faster than any other.

Several new sources of data offer more complete information on pre-baccalaureate postsecondary education. The "High School and Beyond Postsecondary Education Transcript Study" provides transcript information from the postsecondary institutions

attended by the members of the High School and Beyond (HS&B) elder cohort (1980 senior cohort) during their first 4 years after high school. Similar information on 1972 high school seniors is available from the "National Longitudinal Study of the High School Class of 1972 Postsecondary Education Transcript Study." Transcripts make it possible to distinguish different types of postsecondary courses, to see how much postsecondary vocational education (as well as academic education) different students receive, and to see whether they complete programs defined by specific credentials. Furthermore, because such analyses are based on transcripts rather than on the courses and degrees reported by students, they are less subject to the types of errors caused by misreporting (e.g., overestimating program completion rates, numbers of courses taken, credits earned, and inflation of high school grades).

Nature of the Report and Report Organization

This report is concerned mainly with the education of postsecondary vocational completers, defined as those students who receive a vocational A.A. degree or a certificate. These students represent only a fraction of all students who take postsecondary vocational courses. That is because of a high rate of noncompletion in community colleges and trade and technical schools. In addition, many postsecondary students who intend to complete academic credentials take some vocational courses. Nonetheless, students completing vocational credentials are a population of special interest because--unlike noncompleters, who may be casual students without clear vocational goals and without a coherent set of courses--completers should have finished an organized program that provides them with job skills in a particular area. Throughout the report, students completing vocational A.A. degrees are compared with students completing academic A.A. degrees. Such a comparison should provide valuable information about those factors which differentiate the two kinds of programs, both in terms of the characteristics of students who participate in such programs and of the characteristics of the education they receive.

The findings in this report are descriptive. All comparisons cited in the text are included because of their substantive interest. All comparisons are of either estimated percentages or means (averages), weighted to compensate for the sampling designs of the studies.

A statistical test of significance (Student's t or chi-square) was performed on all comparisons cited in the text. The results of the test are used to limit the chances of reporting differences that might be due to sampling variation instead of

differences in the populations of interest. The tests are not used to assess any formal hypotheses about the expected differences in specific populations of students. Unless otherwise noted, all differences described in the report are significant at the $p \leq .05$ level. More information about these tests and the methodology of the study is provided in the Technical Notes.

The major findings of the analyses follow brief descriptions of the key definitions used throughout and some of the limitations of the data and the analysis. The findings are organized around the type of 2-year credential that students earn. General findings pertaining to the completion of different types of 2-year programs are presented first, along with descriptions of students who complete vocational credentials within 4 years of high school graduation. These findings are followed by descriptions of academic A.A. degree completers. Next, the fields of study of vocational A.A. degree completers, vocational certificate completers, and academic A.A. degree completers are described separately. Some of the characteristics of students receiving credentials in each of these fields are highlighted. The last findings that are reported pertain to the distributions of course credits students earn while pursuing these different types of postsecondary credentials. Throughout, the postsecondary education of 1980 high school graduates is compared with that of 1972 graduates.

Definitions of Vocational and Academic Courses and Degrees

In this analysis, postsecondary vocational education includes those courses and credentials that fall into one of 10 areas: agriculture; business; marketing; health occupations; vocational home economics, including child care; trade and industrial programs, including many of the building trades and traditional craft work; technical and engineering areas, all of which have some scientific component; education; public service, including preparation and continuing education in such occupations as police and firefighter; and design. (Appendix A and the Technical Notes give more detailed information on the instructional programs included in each vocational area and on the process used to define each.) These areas are distinguished from seven academic areas: letters, including most English and literature courses; foreign languages and area studies; humanities; sciences; mathematics; the social sciences; and liberal/general studies, a category used to describe liberal arts programs in community colleges. In addition, remedial and avocational courses (for example, personal, interpersonal, basic skills, and leisure and recreational activities) are distinguished from both vocational and academic courses.

The question of where to draw the line between academic and vocational courses is sometimes difficult. For example, agriculture programs often include some courses in soil sciences and genetics that could be included among academic courses, and health-related occupations usually include some specialized biology and chemistry courses that are quite similar to academic biology and chemistry. Nonetheless, a distinction between vocational and academic areas can be made on the basis of course and program descriptions contained in the Classification of Instructional Programs (CIP). Vocational courses and programs in this report are those which directly relate to the preparation of individuals for paid or unpaid employment, or for additional preparation for a career requiring other than a bachelor's degree or advanced degree.

Limitations

This report concentrates on the postsecondary vocational education of the members of the high school class of 1980 who completed a postsecondary program by 1984, 4 years after graduation. To be sure, many students delayed their entry into postsecondary education or studied part time and took longer to complete programs than would be necessary with full-time study. Therefore, these results do not consider those students who completed programs after 1984. The number of "late" completers may have been especially large for bachelor's degrees, since the only students of the class of 1980 completing B.A. or B.S. degrees by 1984 were those who proceeded directly to college from high school and studied full time.[6] Late completion could be somewhat less common for A.A. degree and short-term certificate programs, since these programs typically take 1 to 2 years and therefore can be more easily completed within the 4-year span analyzed in this report.

As stated previously, throughout this report students completing vocational credentials are compared with students completing academic credentials. However, care should be taken when distinguishing vocational from academic students. Most students today, both degree- and nondegree-seeking, will earn some vocational credits. Similarly, students pursuing vocational A.A. degrees will complete some academic credits and may continue their education by pursuing a baccalaureate degree in an academic program.

Postsecondary Vocational Completers

The rate of completing vocational credentials within the first 4 years following high school graduation was low (see tables 1 and 2). Only 12 percent of students with any postsecon-

ary education completed a vocational A.A. degree or certificate program.[7] Substantially fewer high school graduates (3.2 percent) completed academic A.A. degrees within this 4-year period. Even after only 4 years, 18 percent of the students with postsecondary education experience completed a bachelor's degree, higher than the percentage who received any form of pre-bachelor's vocational credential or academic A.A. degree.[8]

As the data in table 1 show, there were differences in the types of awards students received depending on the type of institutions they attended. Most A.A. degree recipients (66 percent) received their credentials from public 2-year institutions. About one-fifth (21 percent) of students earning A.A. degrees received them from 4-year institutions. The remaining students earned their A.A. degrees from private, non-bachelor's degree-granting schools.[9] Conversely, more students completed certificate programs at private, non-bachelor's degree-granting schools, with 62 percent of all certificate completers earning their award from these institutions. Most of the remaining certificate completers earned their credentials from public, 2-year colleges.

Virtually all certificates were awarded in vocational fields. Twice as many students earned vocational A.A. degrees as academic A.A. degrees in both public, 2-year colleges and 4-year colleges. These findings are consistent with the national data described earlier, where a larger proportion of A.A. degrees were awarded in vocational rather than academic subjects, especially in 2-year colleges.

Tables 2 and 3 present the characteristics of students who completed different types of postsecondary education programs within 4 years of high school graduation. Because the type of program that a student completes is closely tied to the type of institution he or she attends, tables 2 and 3 also contain descriptive data on the characteristics of students who attended 2-year colleges, 4-year colleges, and private, non-bachelor's degree-granting schools. Moreover, for comparison purposes, information on the characteristics of students who complete academic A.A. degrees and bachelor's degrees within the first 4 years after high school graduation is included.

Gender

Of those students who attended a postsecondary institution, a higher percentage of women (13.4 percent) than men (9.6 percent) completed some type of vocational program leading to an A.A. degree or certificate. Women were more likely than men to receive training in private, non-bachelor's degree-granting

Table 1.--Percentage of 1980 high school graduates with any postsecondary education who had received postsecondary credentials as of 1984, by type of credential and by type of institution awarding the credential

Type of Institution	Type of credential			
	Academic A.A. degree	Vocational A.A. degree	Vocational certificate	Bachelor's degree
Total	3.2	7.5	3.6	17.8
Public 2-year college	2.2	4.8	1.1	---
4-year college	0.7	1.5	0.3	17.8
Private non-bachelor's degree-granting school	0.3	1.2	2.3	---
Sample size*	6,380	6,380	6,380	6,380

* Sample size on which estimate is based.
---Data not applicable.

NOTE: Because of rounding, details may not add to totals.

SOURCE: U.S. Department of Education, National Center for Education Statistics, "High School and Beyond Postsecondary Education Transcript Study."

Table 2.--Percentage of 1980 high school graduates with any postsecondary education, by type of postsecondary institution attended and type of credential completed by 1984, by selected student sociodemograhpic characteristics

Sociodemographic characteristic	Sample size*	Percentage of 1980 high school graduates with any postsecondary education who by 1984 had: Attended a public 2-year college	Attended a 4-year college	Attended a private non-bachelor's degree-granting school	Received a vocational A.A. degree	Received a vocational certificate	Received a vocational credential	Received an academic A.A. degree	Received any bachelor's degree
Total	6,380	41.5	64.4	10.4	8.0	3.6	11.6	3.2	17.8
Gender									
Male	2,840	41.9	67.4	7.8	7.0	2.6	9.6	2.6	17.3
Female	3,540	41.2	61.8	12.6	8.9	4.5	13.4	3.8	18.3
Race/ethnicity									
Hispanic	1,163	56.3	49.3	11.7	7.0	6.5	13.5	4.5	6.9
Native American	99	57.8	51.7	16.1	5.8	5.6	11.4	3.7	10.2
Asian	284	47.6	72.4	5.0	3.7	2.6	6.3	4.8	11.7
Black	1,502	39.4	60.1	13.5	4.2	2.2	6.4	1.8	8.8
White	3,319	40.7	65.8	10.0	8.7	3.7	12.3	3.3	19.8
Parents' education									
Less than high school	777	40.9	53.3	19.3	6.1	6.5	12.7	1.9	8.8
High school only	1,558	46.3	52.6	13.6	10.2	5.5	15.7	3.0	12.5
Some college	1,924	47.7	57.5	11.3	9.8	3.6	13.4	2.9	14.3
Bachelor's degree or higher	2,072	33.8	79.0	6.2	5.4	2.1	7.6	3.7	25.4
Family income in 1980									
Less than $7,000	502	39.4	53.4	17.9	4.9	6.2	11.0	1.6	9.3
$7,000-11,999	744	43.3	57.3	12.3	5.2	6.3	11.5	4.2	13.0
$12,000-15,999	858	45.2	54.9	11.6	9.6	2.1	11.8	3.5	12.3
$16,000-19,999	860	46.4	57.2	12.5	9.3	5.0	14.3	2.2	15.1
$20,000-24,999	915	40.0	65.6	10.1	8.7	3.7	12.5	3.2	19.1
$25,000-37,999	1,019	41.3	70.3	9.2	8.9	3.2	12.1	3.4	16.7
$38,000 or more	947	35.3	77.0	7.1	6.3	2.3	8.6	3.7	28.1
Socioeconomic status quartile									
Low	1,862	45.7	49.2	15.8	8.0	5.9	13.9	2.7	8.5
25 to 49%	1,347	47.2	53.9	11.9	9.6	4.9	14.5	3.5	12.5
50 to 75%	1,432	45.1	63.9	10.0	10.1	3.2	13.3	3.0	18.4
High	1,629	32.7	79.8	6.9	5.5	2.0	7.5	3.5	25.7

* Sample size on which estimate is based.

NOTE: Students may attend more than one type of institution; therefore, the percentages of students attending public 2-year colleges, 4-year colleges, and private non-bachelor's degree-granting schools do not add to 100 percent. Because of rounding, details may not add to totals.

SOURCE: U.S. Department of Education, National Center for Education Statistics, "High School and Beyond Postsecondary Education Transcript Study."

Table 3.--Percentage of 1980 high school graduates with any postsecondary education, by type of postsecondary institution attended and type of credential completed by 1984, by selected high school performance characteristics

High school performance characteristic	Sample size*	Percent of 1980 high school graduates with any postsecondary education who by 1984 had: Attended a public 2-year college	Attended a 4-year college	Attended a private non-bachelor's degree-granting school	Received a vocational A.A. degree	Received a vocational certificate	Received a vocational credential	Received an academic A.A. degree	Received any bachelor's degree
Total	6,380	41.5	64.4	10.4	8.0	3.6	11.6	3.2	17.8
HS achievement quartile									
Low	1,176	54.6	34.0	21.4	5.4	7.2	12.7	2.4	3.1
25 to 49%	1,305	54.0	49.9	13.0	9.1	5.4	14.4	3.0	9.7
50 to 75%	1,498	43.0	65.6	10.8	11.1	3.2	14.3	3.3	16.5
High	1,829	28.2	84.7	3.9	5.8	1.4	7.2	3.9	30.3
High school grade average									
A, A-B	2,655	29.6	79.0	6.4	8.7	2.5	11.2	3.7	29.5
B	1,393	44.9	63.9	10.9	8.4	3.5	12.0	2.9	13.3
B-C	1,566	52.2	49.2	14.9	7.8	5.1	12.9	3.2	7.7
C, C-D, D	739	60.3	38.5	15.8	4.9	4.5	9.4	2.2	0.7
High school program									
General	1,952	50.2	53.0	12.9	8.0	4.7	12.6	3.6	10.4
Academic	3,257	31.0	81.9	5.4	6.3	1.7	8.0	3.5	27.0
Vocational/technical	1,095	57.4	32.0	21.7	13.4	8.0	21.4	1.7	2.6
Postsecondary education plans									
None	252	57.1	20.0	25.1	5.2	8.8	14.0	0.6	1.6
Attend a voc/trade school	750	59.4	19.4	30.5	12.9	12.1	25.0	1.5	1.3
Complete less than 4 years college	989	62.5	37.2	14.2	17.7	5.2	22.9	3.8	3.4
Complete a bachelor's degree	2,219	35.4	80.7	4.5	6.5	1.2	7.7	3.2	22.4
Complete an advanced degree	2,052	27.3	86.9	4.3	3.0	1.1	4.1	4.2	30.1

* Sample size on which estimate is based.

NOTE: Students may attend more than one type of institution; therefore, the percentages of students attending public 2-year colleges, 4-year colleges, and private non-bachelor's degree-granting schools do not add to 100 percent. Because of rounding, details may not add to totals.

SOURCE: U.S. Department of Education, National Center for Education Statistics, "High School and Beyond Postsecondary Education Transcript Study."

schools and to receive certificates. Conversely, a higher percentage of men received some postsecondary education in 4-year institutions--although the overall rate for completing a bachelor's degree among those students who had any postsecondary education was roughly equivalent for men and women (17.3 percent and 18.3 percent, respectively).

Race/Ethnicity

Attendance at postsecondary institutions and program completion rates differed by race/ethnicity. Asian students and white students had higher rates of attending 4-year institutions than black, Native American, and Hispanic students. On the other hand, a higher percentage of Hispanic students than black or white students attended public, 2-year colleges.

Although about the same percentage of Asian students and white students enrolled in 4-year institutions, a higher percentage of white students completed a bachelor's degree within 4 years of high school graduation (19.8 percent versus 11.7 percent). Black and Hispanic students had low rates for completing bachelor's degrees within 4 years of graduation (8.8 percent and 6.9 percent, respectively). Hispanic students completed vocational credentials at a rate (13.5 percent), roughly comparable to that of white students (12.3 percent). Slightly more than 6 percent of Asian students and black students completed vocational credentials within 4 years of high school graduation.

Socioeconomic Status

Attendance at postsecondary schools and completion of postsecondary education programs seem to be related to various measures of socioeconomic status. Whether socioeconomic status is measured by parents' education alone or by a composite socioeconomic variable that gives equal weight to mother's and father's education, family income, father's occupational status, and household possessions, its relationship to postsecondary attendance and completion is the same. Children from high status families were more likely to attend 4-year colleges or universities and therefore, less likely to attend public, 2-year colleges or private, non-bachelor's degree-granting schools. Attendance at these latter types of postsecondary institutions was more common among students from lower socioeconomic levels. For instance, about 80 percent of the students from high SES families attended 4-year colleges or universities as compared with less than half (49.2 percent) of the students from low status families. On the other hand, about 46 percent of the

students from the lowest status families attended public, 2-year colleges, while nearly 16 percent attended trade or technical schools. The comparable percentages for students from the highest status families were 33 percent and 7 percent, respectively.

On the basis of the HS&B data, one can expect that children from higher status families are more likely to receive a bachelor's degree and less likely to receive a vocational degree. Also, one in four students from families where at least one parent has a college education, as compared with less than one in 10 students from families where the highest level of parental education is less than a high school diploma, will complete a bachelor's degree within 4 years of high school graduation. The completion rates for any vocational credential by these two student groups were 8 percent and 13 percent, respectively.

High School Performance and Achievement

High school performance and achievement, as measured by students' course grades and their scores on a test specially designed for the HS&B to assess high school achievement, are other factors that relate to postsecondary education attendance and completion. As the percentages in table 3 indicate, students with low high school grade averages (C, C-D, D) attended public, 2-year colleges at a higher rate than students who earned high grades (A, A-B) while in high school. They also attended private, non-bachelor's degree-granting schools at a rate twice that of the students with high grades (15.8 percent versus 6.4 percent). Students with high grades also attended 4-year institutions at about twice the rate of those with low grades (79 percent versus 38.5 percent).

The percentage of students completing vocational A.A. degrees and vocational certificates does not vary much by high school grades. However, the rates at which students completed a bachelor's degree varied by their high school grade averages. Less than 1 percent of postsecondary students who had a C or D average in high school completed a bachelor's degree within 4 years of graduation, while 30 percent of those with an A or a B+ average did so.

Thus, the data suggest that high achieving students have a higher probability of attending 4-year institutions and a lower probability of attending public, 2-year colleges or private, non-bachelor's degree-granting schools. In addition, high achievers are significantly more likely to complete a bachelor's degree.

Over half--55 percent--of those students in the bottom quartile of the high school achievement score distribution who

went on to attend a postsecondary school, attended public 2-year colleges. For those students in the bottom quartile who earned any postsecondary credential (i.e., vocational and academic A.A. degree, vocational certificate, or bachelor's degree), 70 percent completed a vocational program.

High School Program and Postsecondary Education Aspirations

A student's program of study during high school--whether an academic, vocational, or general program--can be associated with attendance at different types of postsecondary institutions and the student's likelihood of completing different programs.[10] For postsecondary students who reported having been in a high school academic program, 82 percent attended a 4-year college. Only 32 percent of students who participated in a vocational program in high school attended a 4-year college. Vocational students were more likely than academic students to attend public, 2-year colleges and private, non-bachelor's degree-granting schools. Only 3 percent of high school vocational students completed a bachelor's degree within 4 years of high school graduation, compared with 27 percent of academic students. On the other hand, 21 percent of vocational students completed a vocational credential, compared with only 8 percent of academic students. Of those high school vocational students who completed a postsecondary vocational credential, vocational A.A. degrees were earned at a rate more than 1.5 times as often as certificates.

Students' educational aspirations can also be related to their postsecondary educational attainment. Table 3 suggests that high school students who aspire to a bachelor's or advanced degree, and go on to attend a postsecondary school, are more likely than students with lower educational aspirations to attend 4-year institutions. On the other hand, students whose postsecondary educational plans do not include 4 years of college are more likely to attend public 2-year institutions and private, non-bachelor's degree-granting schools.

The probability that a student receives any vocational credential within 4 years of high school graduation varies by his or her postsecondary education plans while in high school. The data suggest that students who aspire to less than a college education are more likely to earn a vocational credential than students who aspire to a college degree. Only 2 percent of students with no postsecondary education plans completed B.A. or B.S. degrees within 4 years of high school graduation. About 22 percent of the students whose postsecondary aspirations while in high school were to obtain a B.A. or B.S. degree, and 30 percent of those with post-baccalaureate degree aspirations, completed bachelor's degrees within 4 years of high school graduation.

The findings pertaining to educational aspirations and attainment suggest that the aspirations for higher education formed while in high school are reflected in subsequent enrollments and completion of credentials. However, not all students realized their aspirations within the time period covered by the survey data. For example, 4 years after high school, only 25 percent of those students planning to attend/complete a vocational or technical school had in fact received a vocational credential; only 22 percent of those aspiring to a bachelor's degree, and 30 percent of those hoping to receive an advanced degree, had completed a B.A or B.S. There is little evidence to suggest that students' educational attainment extends beyond their aspirations. Among those students who attended postsecondary education institutions, students aspiring to vocational degrees while in high school rarely completed a bachelor's program (1.3 percent). About 19 percent of these students enrolled in 4-year institutions where there is the highest likelihood of receiving a B.A. or B.S. degree.

Academic A.A. Degree Completers

Few high school seniors completed academic A.A. degree programs within the first 4 years following graduation (see table 1). Of all 1980 graduates who attended some kind of postsecondary school, only 3 percent completed an academic A.A. degree within this period of time.

The majority of both academic and vocational A.A. degree completers received their awards from public, 2-year institutions (see table 1). Almost a quarter (23 percent) of students with academic A.A. degrees received them from institutions that grant B.A. or B.S. degrees. Only 9 percent of the students received academic A.A. degrees from private, non-bachelor's degree-granting institutions.

Students who received an academic A.A. degree were heterogeneous, drawn from a wide range of backgrounds and interests. When the background characteristics of students who earned academic A.A. degrees (see tables 2 and 3) were examined, few differences emerged. A somewhat smaller percentage of black students (1.8 percent) received academic A.A. degrees than did white students (3.3 percent), but the difference is too small to be of practical or descriptive importance.

Students' high school performance and achievement, as measured by their high school grades and their scores on a standardized achievement test, do not appear to be related to completion of an academic A.A. degree. The data show that a

smaller percentage of students from vocational high school programs (1.7 percent) completed an academic A.A. degree program than did students from either an academic (3.5 percent) or a general program (3.6 percent), but the differences are very small.

The data seem to show that educational aspirations are not strongly related to academic A.A. completion rates. Students whose postsecondary education plans while in high school included college attendance/completion did earn academic A.A. degrees at a greater rate than students with lower aspirations,[11] but students whose postsecondary education aspirations ranged from some college attendance to completion of an advanced degree had similar rates of completing an academic A.A. degree. Students with no postsecondary education aspirations had especially low completion rates (less than 1 percent).

Postsecondary Education Program Completers: 1980 Versus 1972

Table 4 presents data on the completion rates of 1980 and 1972 high school seniors within 4 years of high school graduation. Data for the 1972 graduates come from the "National Longitudinal Survey of the Class of 1972" (NLS-72) transcript survey conducted in 1979. (In order to preserve comparability with the HS&B data, the same period of comparison of 4 years after high school graduation is used.)

Although almost a decade apart, the overall patterns of credential completions by 1972 and 1980 graduates are similar. There was a small increase in the rate with which 1980 graduates completed postsecondary vocational credentials, attributable mostly to the increase in the rate at which they completed vocational A.A. degree programs. A lower percentage of the members of the 1980 high school class completed an academic A.A. degree program within the first 4 years of high school graduation. They also completed bachelor's programs within 4 years of graduation at a lower rate than 1972 graduates.

Fields of Study for Students Completing Vocational A.A. Degrees

Students received their vocational A.A. degrees in markedly different areas. Among those students completing vocational A.A. degrees, the most prevalent fields of study were business, technical and engineering, and health (see table 5). About 35 percent of the students received degrees in business, with another 6 percent receiving degrees in the closely related area of marketing. Technical and engineering degrees were awarded to 26 percent of the students, while 13 percent received degrees in health areas.

Table 4.--Percentage of high school graduates with any postsecondary education who had received any credential within 4 years of graduation, by type of credential and year of graduation

Year of graduation	Sample size*	Type of credential received				
		Vocational A.A. degree	Vocational certificate	Any vocational credential	Academic A.A. degree	Bachelor's degree
1980 1/	6,380	8.0	3.6	11.6	3.2	17.8
1972 2/	9,213	6.4	3.7	10.1	4.8	22.5

* Sample size on which estimate is based.

SOURCE: 1/U.S. Department of Education, National Center for Education Statistics, "High School and Beyond Postsecondary Education Transcript Study."
2/U.S. Department of Education, National Center for Education Statistics, "NLS-72 Postsecondary Education Transcript Study."

Table 5.--Percentage distribution of area of study for 1980 high school graduates completing vocational A.A. degrees as of 1984, by selected student characteristics

Student characteristic	Sample size1/	Area of study									
		Agriculture	Business	Marketing	Health	Home economics	Trade & industry	Technical/ engineering	Education	Public service	Design
Total	428	4.4	34.6	6.3	12.7	1.8	4.1	25.7	6.3	3.2	1.0
Gender											
Male	170	7.9	22.3	3.4	3.7	1.5	6.3	48.9	2.2	2.9	0.7
Female	258	2.1	42.8	8.2	18.6	1.9	2.7	10.3	9.0	3.3	1.1
Race/ethnicity2/											
Hispanic	61	0.0	47.4	4.0	19.7	3.4	6.6	10.5	6.0	2.5	0.0
Black	61	0.0	44.6	4.8	8.2	1.1	7.3	19.4	3.9	4.3	6.3
White	286	5.0	33.3	6.6	12.8	1.8	3.6	26.9	6.5	3.1	0.6
Parents' education											
Less than high school	36	0.0	42.5	0.0	16.9	0.0	6.9	16.9	13.7	0.8	2.4
High school only	124	2.7	44.5	7.3	9.3	1.9	4.4	24.9	2.1	3.1	0.0
Some college	150	6.8	24.9	5.7	16.3	0.1	5.3	28.7	8.5	1.8	1.9
Bachelor's degree or higher	113	3.7	37.5	7.4	8.7	4.5	1.7	24.0	6.6	5.6	0.4
Family income in 1980 3/											
$7,000-11,999	43	9.0	25.4	11.5	14.2	0.0	1.7	20.9	10.4	5.2	1.9
$12,000-15,999	60	1.4	40.2	4.3	13.1	0.8	6.4	31.8	1.0	0.3	0.9
$16,000-19,999	59	7.7	37.0	5.3	11.5	0.0	1.6	19.6	17.5	0.0	0.0
$20,000-24,999	72	8.6	34.9	6.2	16.7	2.8	3.3	24.6	0.8	1.1	0.9
$25,000-37,999	84	0.5	34.8	5.1	14.3	1.8	0.4	36.4	0.5	5.8	0.4
$38,000 or more	58	5.1	39.4	10.9	1.7	4.8	7.0	16.3	6.1	5.6	3.1
Socioeconomic status quartile											
Low	118	4.7	33.8	2.4	13.8	0.8	4.4	27.7	8.4	2.5	1.5
25 to 49%	97	8.0	38.0	6.4	12.0	1.4	3.3	20.4	9.0	0.3	1.2
50 to 75%	118	2.3	32.4	7.2	14.2	0.3	6.1	27.2	5.2	4.1	1.0
High	91	3.6	36.1	7.9	10.8	5.1	2.1	25.7	3.2	5.2	0.5

Table 5.--Percentage distribution of area of study for 1980 high school graduates completing vocational A.A. degrees as of 1984, by selected student characteristics--Continued

Student characteristic	Sample size1/	Area of study									
		Agriculture	Business	Marketing	Health	Home economics	Trade & industry	Technical/ engineering	Education	Public service	Design
Total	428	4.4	34.6	6.3	12.7	1.8	4.1	25.7	6.3	3.2	1.0
HS achievement quartile											
Low	64	1.2	41.8	11.3	8.5	2.1	8.5	15.2	6.3	3.0	2.1
25 to 49%	95	6.4	49.5	6.0	9.4	5.0	5.1	13.5	0.2	3.3	1.6
50 to 75%	132	4.8	32.8	3.2	11.2	0.7	4.7	31.5	6.8	3.9	0.5
High	104	2.9	25.9	12.2	15.0	1.1	2.4	31.3	7.6	0.5	1.1
High school grade average4/											
A, A-B	196	2.5	35.3	4.0	14.9	2.0	2.5	29.1	6.5	2.1	1.1
B	97	7.8	30.9	10.1	12.1	0.3	5.6	20.7	6.2	5.4	0.8
B-C	109	3.1	35.8	8.9	9.4	3.1	2.8	25.0	6.9	3.7	1.2
High school program											
General	134	5.0	30.6	4.5	10.8	2.9	4.8	24.6	10.3	5.2	1.2
Academic	180	2.0	32.1	7.2	15.7	1.9	4.6	26.0	5.8	3.8	1.0
Vocational/technical	110	7.7	42.0	6.9	10.2	0.4	2.3	27.0	2.9	0.0	0.7
Postsecondary education Plans5/											
Attend a voc/trade school	78	3.0	32.4	10.1	10.1	4.0	5.0	29.7	0.9	3.5	1.3
Complete less than 4 years college	146	5.4	40.9	3.3	15.6	2.0	3.5	18.2	7.9	2.4	0.8
Complete a bachelor's degree	129	3.0	30.1	9.1	10.3	0.2	3.8	29.5	10.0	3.4	0.8
Complete an advanced degree	58	9.1	39.3	4.9	13.9	1.1	1.4	21.2	3.1	4.4	1.6

1/Sample size on which estimate is based.
2/Estimates for Asian and Native American degree recipients are not reported because of small sample sizes (n < 30).
3/Estimates for degree recipients with less than $7,000 family income are not reported because of small sample size (n < 30).
4/Estimates for degree recipients who had high school grade averages of C, C-D, or D are not reported because of small sample size (n < 30).
5/Estimates for degree recipients who had no specific postsecondary education plans are not reported because of the small sample size (n < 30).

SOURCE: U.S. Department of Education, National Center for Education Statistics, "High School and Beyond Postsecondary Education Transcript Study."

The following sections describe the characteristics of students who earned degrees in specific vocational areas. The descriptions concentrate mostly on those subject areas with the highest completion rates--business, technical and engineering, and health. The findings that are reported pertain only to the population of students who completed a vocational A.A. degree within 4 years of high school graduation.

Gender

The fields of study of men and women who earn vocational A.A. degrees differed significantly. Men (49 percent) were more likely than women (10 percent) to earn degrees in technical and engineering programs and agriculture (8 percent versus 2 percent, respectively). A higher percentage of women than men earned degrees in business (43 percent versus 22 percent, respectively) and health (19 percent versus 4 percent, respectively).

Race/Ethnicity

Students in different racial and ethnic groups concentrated their A.A. degrees in different subject areas. Hispanic students were more likely than white students to receive degrees in technical and engineering fields. The percentage of black students who earned A.A. degrees in technical and engineering fields (19.4 percent) was midway between Hispanic (10.5 percent) and white students (26.9 percent).

Socioeconomic Status

The rate of completion of vocational A.A. degrees in technical and engineering, business, and health fields was about the same for students from different socioeconomic levels. Parents' education, family income, and family composite SES score do not appear to relate to a student's likelihood of receiving a degree in any one of these fields of study.

High School Performance and Achievement

Students' high school academic achievement seems to relate to the fields of study in which their A.A. degrees were earned. In particular, a higher percentage of students with lower academic achievement (those in the bottom half of the achievement score range) earned technical and engineering vocational degrees than did their higher-scoring peers.[12] These lower-scoring students earned business degrees at a higher rate than students scoring in the upper half of the achievement score distribution.[13]

For the most part, the field of study in which a vocational A.A. degree is earned seems unrelated to a student's high school grade average.

High School Program and Postsecondary Education Aspirations

Students' high school programs--vocational, academic, or general--do not appear to be related to completion of vocational A.A. degrees in any specific field of study. Neither do students' educational aspirations while high school seniors seem to be related to completion of a degree program in any given field of study, although such aspirations appear related to postsecondary educational attainment in general.

Fields of Study for Students Completing Certificates

As with vocational A.A. degrees, there were significant differences in the fields of study for students completing certificate programs (see table 6). However, the fields of study for students completing vocational certificate programs were somewhat different than those for vocational A.A. degree completers. A larger percentage of the certificates received were in trades and industry, while fewer were earned in technical and engineering areas. The percentage of students earning certificates in health (21.4 percent) exceeded the percentage earning vocational A.A. degrees in this field (12.7 percent).[14] As in the case of A.A. degrees, the largest percentage of certificate completers (31 percent) studied business. Trade and industry and health occupations replaced technical and engineering as the next most often completed vocational programs.

Gender

Men and women earned certificates in quite different fields of study. A higher percentage of men than women received certificates in trades and industry and technical and engineering areas. Agriculture was almost totally dominated by men. A higher percentage of women than men earned certificates in business; certificates in health occupations were earned almost exclusively by women.

Race/Ethnicity

Students from different racial/ethnic groups differed little in terms of the fields in which they earned vocational certificates. An exception to this pattern was that white students received certificates in health occupations at a higher rate than Hispanic students.

Table 6.--Percentage distribution of area of study for 1980 high school graduates completing certificates as of 1984, by selected student characteristics

Student characteristic	Sample size1/	Area of study									
		Agriculture	Business	Marketing	Health	Home economics	Trade & industry	Technical/ engineering	Education	Public service	Design
Total	207	2.5	31.0	3.3	21.4	1.3	24.6	11.9	3.3	0.0	0.6
Gender											
Male	79	7.4	12.4	3.8	0.5	0.0	45.5	29.5	0.0	0.0	1.1
Female	128	0.0	40.8	3.1	32.5	2.0	13.6	2.6	5.1	0.0	0.4
Race/ethnicity2/											
Hispanic	50	0.0	23.2	22.4	3.6	0.0	36.0	14.8	0.0	0.0	0.0
Black	27	0.0	31.5	0.0	16.9	0.0	40.8	7.6	0.0	0.0	3.3
White	118	2.8	32.0	1.8	24.0	1.6	21.6	11.8	4.0	0.0	0.5
Parents' education											
Less than high school	34	0.0	46.4	17.0	14.6	0.0	16.0	6.0	0.0	0.0	0.0
High school only	66	0.7	31.4	0.6	29.9	3.7	23.4	6.1	3.0	0.0	1.2
Some college	66	7.2	22.8	4.4	15.5	0.0	32.7	13.6	3.3	0.0	0.5
Bachelor's degree or higher	38	0.0	35.1	0.0	20.3	0.0	17.8	21.3	5.4	0.0	0.1
Socioeconomic status quartile											
Low	80	5.3	28.4	7.4	25.9	0.0	26.5	5.0	0.0	0.0	1.6
25 to 49%	54	3.8	34.6	3.6	15.9	4.2	27.3	6.7	3.4	0.0	0.4
50 to 75%	39	0.0	26.6	1.3	30.7	0.0	16.5	15.9	9.0	0.0	0.2
High	30	0.0	35.8	0.0	13.8	0.0	23.5	25.8	1.0	0.0	0.1

Table 6.--Percentage distribution of area of study for 1980 high school graduates completing certificates as of 1984, by selected student characteristics--Continued

Student characteristic	Sample size1/	Area of study									
		Agriculture	Business	Marketing	Health	Home economics	Trade & industry	Technical/ engineering	Education	Public service	Design
Total	207	2.5	31.0	3.3	21.4	1.3	24.6	11.9	3.3	0.0	0.6
HS achievement quartile3/											
Low	64	4.7	23.5	7.1	12.9	0.0	41.8	4.8	4.4	0.0	0.8
25 to 49%	55	0.0	37.3	4.9	34.7	0.0	17.0	6.2	0.0	0.0	0.0
50 to 75%	44	0.0	32.5	1.0	23.3	0.0	20.3	16.1	5.2	0.0	1.6
High school grade average											
A, A-B	53	0.0	39.3	0.0	32.7	0.0	11.3	9.0	7.7	0.0	0.0
B	43	11.2	15.4	12.4	20.0	0.0	14.0	21.9	4.6	0.0	0.6
B-C	74	0.0	33.0	0.9	15.8	4.1	35.2	10.4	0.0	0.0	0.7
C, C-D, D	34	0.0	32.0	1.7	16.1	0.0	42.2	6.2	0.0	0.0	1.9
High school program											
General	76	3.1	25.3	3.7	19.4	3.5	30.1	14.4	0.0	0.0	0.6
Academic	52	6.1	24.3	0.0	40.8	0.0	6.0	7.4	14.7	0.0	0.7
Vocational/technical	75	0.0	40.5	4.9	11.9	0.0	30.2	12.0	0.0	0.0	0.5
Postsecondary education plans4/											
Attend a voc/trade school	91	4.9	26.5	6.4	10.8	0.0	33.8	15.0	2.2	0.0	0.5
Complete less than 4 years college	41	0.0	41.4	0.0	40.6	6.0	9.2	2.8	0.0	0.0	0.0

1/Sample size on which estimate is based.
2/Estimates for Asian and Native American certificate completers are not reported because of small sample sizes (n < 30).
3/Estimates for certificate completers whose high school achievement scores were in the highest quartile are not reported because of the small sample size (n < 30).
4/Estimates for degree recipients who had no specific postsecondary education plans or their plans included college completion are not reported because of the small sample sizes (n < 30).

NOTE: Estimates based on fewer than 30 responses should be interpreted with caution because they tend to be unstable.

SOURCE: U.S. Department of Education, National Center for Education Statistics, "High School and Beyond Postsecondary Education Transcript Study."

Socioeconomic Status

For students who earned certificates, completion of a technical and engineering program might be related to family socioeconomic status. On the basis of this study, it seems that students whose parents have college degrees have a relatively high likelihood of receiving technical and engineering certificates. About 21 percent of these students earned certificates in a technical or engineering program, while about 6 percent of those students whose parents had a high school education or less did so.[15] This apparent relationship between family socioeconomic status and completion of certificate programs in technical and engineering is further reinforced by the association between the completion rates in these fields and students' position with respect to the SES composite indicator. A higher percentage of high socioeconomic status students than students in each of the lowest two quartiles of SES completed technical and engineering certificate programs.

High School Performance and Achievement

Students' high school academic achievement appears related to the likelihood of completing a certificate program in certain subject areas. Students who scored in the lowest quartile on the HS&B test designed to assess high school achievement were more likely to complete trade and industry certificate programs than students who scored in the second or third quartiles.[16] High school achievement does not seem to be related to completion of business or technical/engineering certificate programs.

Students with moderately high grades (B's) earned certificates in technical and engineering fields at a higher rate than students with mostly C's and D's. Students who earned mostly C's and D's in their high school courses completed certificate programs in trades and industry at nearly 4 times the rate of students who earn mostly A's and B's.

High School Program and Postsecondary Education Aspirations

A higher percentage of students in high school academic programs (as compared with students in high school vocational programs who complete a certificate program within 4 years of high school graduation) earned their certificate in health occupations. High school vocational students received more certificates in trade and industry. A higher percentage of students from high school vocational programs completed certificate programs than students from high school academic programs (see Table 3). One implication of this finding is that

high school vocational programs--which tend to be dominated by the traditional trades--continue to influence the fields students study at the postsecondary level.

Students whose postsecondary educational aspirations include vocational or technical school training appear more likely than certain other students to complete trade and industry certificate programs. One-third (34 percent) of the students who aspired to attend a vocational or technical school after graduation completed certificate programs in this subject area within 4 years of finishing high school, as compared with fewer than 1 in 10 of the students who aspired to less than a 4-year college education. The small sample sizes for students completing certificate programs and aspiring to complete college prevents any comparisons of these latter groups.

Fields of Study for Vocational Program Completers: 1980 Versus 1972

The areas of study for both vocational A.A. degree and certificate recipients were fairly consistent for 1980 and 1972 high school graduates (see table 7). However, between 1972 and 1980, gains were posted by business and technical and engineering vocational A.A. degree programs. Nearly 35 percent of the vocational A.A. degree completers from the high school class of 1980 earned their degrees in business, as compared with about 28 percent of the 1972 seniors. The percentage of graduates in 1980 who earned A.A. degrees in a technical and engineering field was almost 26 percent, as compared with 14 percent of the students who graduated in 1972.

The percentages of high school graduates earning certificates in the different vocational subject areas have remained about the same over the 8-year period covered by the HS&B and NLS-72 surveys. A possible exception to this pattern is trade and industry, where there is some evidence that the percentage of graduates earning certificates in this program area has increased.[17]

Fields of Study for Students Completing Academic A.A. Degrees

As table 8 shows, students received academic A.A. degrees in a wide range of subject areas. The most popular areas of concentration were social science and the broad area of liberal and general studies, with nearly one-half (49.3 percent) of all degree recipients earning their degrees in these areas. The humanities and sciences were the next most prevalent areas in which academic A.A. degrees were awarded. About 17 percent of the students earned their degrees in the humanities (including

Table 7.--Percentage distribution of area of study for high school graduates completing postsecondary credentials within 4 years of graduation, by type of credential and by year of graduation

Type of credential/ year of graduation	Sample size*	Area of Study									
		Agriculture	Business	Marketing	Health	Home economics	Trade/ industry	Technical/ engineering	Education	Public service	Design
Vocational A.A. degree											
1980 1/	428	4.4	34.6	6.3	12.7	1.8	4.1	25.7	6.3	3.2	1.0
1972 2/	569	6.2	27.7	5.9	19.8	2.5	7.5	14.0	7.9	7.1	1.5
Certificate											
1980 1/	207	2.5	31.0	3.3	21.4	1.3	24.6	11.9	3.3	0.0	0.6
1972 2/	307	2.7	31.4	2.1	22.7	1.5	17.7	12.6	5.1	0.5	3.7

* Sample size on which estimate is based.

SOURCE: 1/U.S. Department of Education, National Center for Education Statistics, "High School and Beyond Postsecondary Education Transcript Study."
2/U.S. Department of Education, National Center for Education Statistics, "NLS-72 Postsecondary Education Transcript Study."

Table 8.--Percentage distribution of area of study for 1980 high school graduates completing academic A.A. degrees as of 1984, by selected student characteristics

Student characteristic	Sample size1/	Area of Study						
		Letters	Foreign language	Humanities	Science	Mathematics	Social science	Liberal/ general studies
Total	246	8.8	4.4	16.5	15.2	5.9	24.7	24.6
Gender								
Male	91	4.2	0.0	16.8	17.2	5.1	30.2	26.5
Female	155	11.5	7.0	16.3	14.0	6.4	21.3	23.5
Race/ethnicity2/								
Hispanic	78	6.2	0.0	5.2	6.4	0.9	35.0	46.3
Black	33	13.3	4.9	18.2	6.3	0.0	21.8	35.5
White	117	8.8	4.4	17.0	17.1	7.0	24.6	21.1
Parents' education3/								
High school only	56	7.2	1.8	23.9	14.8	8.3	21.0	23.0
Some college	70	11.2	5.3	17.7	17.1	5.6	23.4	19.7
Bachelor's degree or higher	94	7.9	5.5	13.4	15.7	5.7	26.0	25.8
Family income in 1980 4/								
$7,000-11,999	35	3.0	0.0	4.9	23.0	0.0	29.5	39.6
$12,000-15,999	35	12.2	3.2	37.7	13.5	0.5	24.0	9.0
$20,000-24,999	38	0.1	0.0	11.8	29.2	15.6	11.6	31.8
$25,000-37,999	36	15.2	0.0	16.8	2.2	7.4	30.0	28.5
$38,000 or more	50	11.7	12.7	9.7	2.6	6.3	40.2	16.8
Socioeconomic status quartile								
Low	56	5.8	0.0	18.1	18.9	0.4	27.7	29.1
25 to 49%	56	11.0	3.0	24.1	20.3	3.6	8.8	29.2
50 to 75%	59	6.6	5.0	11.6	18.7	10.2	26.6	21.3
High	70	10.4	6.8	14.3	4.9	6.8	33.3	23.5

Table 8.--Percentage distribution of area of study for 1980 high school graduates completing academic A.A. degrees as of 1984, by selected student characteristics--Continued

Student characteristic	Sample size1/	Area of Study						
		Letters	Foreign language	Humanities	Science	Mathematics	Social science	Liberal/ general studies
Total	246	8.8	4.4	16.5	15.2	5.9	24.7	24.6
HS achievement quartile								
Low	30	9.9	0.0	37.8	14.1	0.0	3.4	34.9
25 to 49%	52	3.7	1.7	18.5	8.7	0.0	25.9	41.5
50 to 75%	73	4.9	0.0	22.2	17.9	11.4	21.6	22.1
High	76	15.2	6.3	9.4	13.0	7.4	31.1	17.5
High school grade average5/								
A, A-B	119	11.4	8.1	13.5	16.1	10.1	21.6	19.4
B	57	8.3	2.0	16.1	9.2	1.8	25.2	37.6
B-C	52	6.3	0.0	21.3	22.9	0.0	24.1	25.4
High school program								
General	79	11.7	3.8	23.8	12.2	0.9	24.1	23.4
Academic	136	8.2	4.9	9.9	19.7	9.9	26.5	20.9
Vocational/technical	29	3.1	4.4	34.2	0.0	0.0	19.5	39.0
Postsecondary education plans6/								
Complete less than 4 years college	44	2.2	6.6	24.4	13.5	6.9	9.8	36.7
Complete a bachelor's degree	91	12.7	1.1	24.4	8.1	7.2	18.7	27.7
Complete an advanced degree	95	7.1	7.2	8.4	25.6	4.2	34.9	12.6

1/Sample size on which estimate is based.
2/Estimate for Asian and Native American degree recipients are not reported because of small sample sizes (n < 30).
3/Estimates for degree recipients whose parents had less than a high school education are not reported because of small sample size (n < 30).
4/Estimates for degree recipients whose family income was less than $7,000 or between $16,000 and $19,000 are not reported because of small sample sizes (n < 30).
5/Estimates for degree recipients whose high school grade average was C, C-D, or D are not reported because of the small sample size (n < 30).
6/Estimates for degree recipients who had no specific postsecondary education plans or whose plans included attendance at a vocational/trade school are not reported because of small sample sizes (n < 30).

NOTE: Estimates based on fewer than 30 responses should be interpreted with caution because they tend to be unstable.

SOURCE: U.S. Department of Education, National Center for Education Statistics, "High School and Beyond Postsecondary Education Transcript Study."

philosophy, history, and art), while 15 percent of the students earned their degrees in science. Small percentages of students received academic A.A. degrees in mathematics (5.9 percent) and foreign languages (4.4 percent).

When the characteristics of students who earn degrees in the different subject areas are examined, relatively few differences appear (see table 8). In part, this is a result of the small number of students who completed academic A.A. degrees, making it difficult to find statistically significant differences.

In contrast to vocational A.A. degrees and certificates, where fields of study were differentiated by gender, there were few differences between men and women in the fields of study of academic A.A. degree recipients. About three times the percentage of women as men majored in letters, and foreign languages appear to be the nearly exclusive domain of women. However, there was little difference in the percentages of men and women majoring in mathematics and science, which are generally thought to be segregated by gender.

Fields of Study for Students Completing Academic A.A. Degrees: 1980 versus 1972

Although students who graduated in 1980 earned fewer academic A.A. degrees than students who graduated in 1972, the fields in which they earned academic A.A. degrees changed little (see table 9). Roughly one-fourth of the high school seniors in both 1972 and 1980 who earned academic A.A. degrees concentrated in one of the social sciences, and another one-fourth earned degrees in general studies.

Credits Received by Students Completing Vocational A.A. Degrees

The remainder of this report examines the course-taking patterns of students who completed vocational and academic postsecondary programs. The analysis concentrates on the patterns of study of vocational A.A. degree and certificate completers, as well as academic A.A. degree completers.

There are two different ways to examine the course-taking patterns of students in postsecondary vocational programs: 1) by counting the courses students take; and 2) by examining the credits they receive. Counting courses has the great advantage of simplicity. However, it fails to consider the varying intensity and duration of courses. Nevertheless, the results of these two different ways of examining student participation are quite similar.

Table 9.--Percentage distribution of area of study for high school graduates completing academic A.A. degrees within 4 years of graduation, by year of graduation

Year of graduation	Sample size*	Area of Study						
		Letters	Foreign language	Humanities	Science	Mathematics	Social science	Liberal/ general studies
1980 1/	246	8.8	4.4	16.5	15.2	5.9	24.7	24.6
1972 2/	431	6.6	1.5	15.5	16.8	4.1	28.4	27.1

* Sample size on which estimate is based.

SOURCE: 1/U.S. Department of Education, National Center for Education Statistics, "High School and Beyond Postsecondary Education Transcript Study."
2/U.S. Department of Education, National Center for Education Statistics, "NLS-72 Postsecondary Education Transcript Study."

This report uses credits received as the basis of its analysis of postsecondary vocational course-taking patterns because of the ability to distinguish between short-term and longer, more intensive courses. This is especially important in vocational areas, where courses often do not follow the same duration and sequence of academic courses. In addition, the analysis includes only credit courses, and only courses for which a student receives a passing grade.

Because the credits reported by postsecondary institutions for the successful completion of a course vary in their definition, all reported credits are adjusted to conform to the credits received in a standard college on the semester system. Information on these adjustments is provided in the technical notes.

As the data in table 10 show, students who completed vocational A.A. degrees received an average of about 28 credits in their major fields and another 12 credits in vocational courses other than their major area of study. Approximately 29 credits, on average, were earned in academic subjects, with another 2.5 credits earned in remedial and avocational courses. These findings suggest that the vocational A.A. degree is not a narrowly constructed degree. That is, a large number of credits are earned in academic subjects, and students tend to take a fair number of vocational courses outside their major area of study rather than confining themselves to one area.

Table 10 also presents some of the patterns of the credits earned by students completing degrees in different vocational programs.[18] By and large, course-taking patterns in different vocational programs were similar. There were no substantial differences in the average number of total credits received by students who completed vocational A.A. programs in a variety of fields. On average, students in each subject area earned between 40 and 43 vocational credits in their pursuit of an A.A. degree, with the majority of these vocational credits in the students' major fields.

The patterns of academic course-taking for vocational A.A. degree recipients generally conform to expectations. Students who completed degrees in a health program received an average of 13.9 credits in mathematics and science, as compared with the overall average of 10.2 credits in these subjects. Students completing technical/engineering degree programs earned 13.2 credits in mathematics and science courses.

Table 10.--Average number of vocational, academic, and remedial credits earned by 1980 high school graduates completing vocational A.A. degrees as of 1984, by area of study

Area of study	Sample size*	Total credits	Vocational credits					Academic credits				Remedial/ avocational
			Total vocational credits	Credits in major area	Credits in other vocational areas: Business & marketing	Credits in other vocational areas: Trade & industry/ technical/ engineering	Credits in other vocational areas: Other	Total academic credits	Math & science	Letters	Other academic	
Total	428	71.8	39.7	28.0	6.0	5.0	3.3	29.3	10.2	6.8	12.3	2.5
Business	147	70.0	39.5	30.6	2.2	4.6	2.0	27.7	7.6	7.6	12.5	2.5
Health	55	73.6	40.2	35.2	2.3	0.8	1.9	31.8	13.9	6.0	12.0	1.6
Technical/ engineering	94	70.5	42.5	29.7	5.0	6.0	2.2	26.0	13.2	5.6	7.2	1.6

* Sample size on which estimate is based.

NOTE: Because of rounding, details may not add to totals.

SOURCE: U.S. Department of Education, National Center for Education Statistics, "High School and Beyond Postsecondary Education Transcript Study."

Credits Received by Students Completing Certificate Programs

The most striking difference between students completing certificate programs and those completing A.A. degrees is the amount of coursework (see tables 10 and 11).[19] Students who completed certificates accumulated an average of 39.3 total credits, as compared with 71.8 credits for students completing vocational A.A. degrees. On average, they also accumulated about 7 credits fewer in their major subject areas than those completing A.A. degrees. Certificate completers earned a higher percentage of their total credits in their major vocational area, as compared with vocational A.A. degree completers (54 percent versus 39 percent, respectively) and fewer credits in academic subjects. About 30 percent of the total credits earned by certificate completers were in academic subjects, as compared with about 41 percent of the total credits earned by vocational A.A. degree recipients. Thus, as compared with vocational A.A. degree programs, certificate programs were more narrowly focused on vocational objectives, with less coursework outside a major area and less academic coursework.

The credit patterns described above differ from the patterns for some vocational fields, as table 11 indicates. Students in trade and industry programs received an average of 28.2 credits, 20.9 credits of which were directly in the student's major. Those students receiving certificates in health occupations, on the other hand, earned more credits overall than students completing trade and industry certificate programs--an average of 47.6--despite receiving only a few more credits (26.1 versus 20.9) in their major subjects. The real difference lies in the number of academic credits each group of students received. Students completing a trade and industry certificate program earned 4.2 academic credits, as compared with the 14.1 academic credits certificate completers in health programs received. Students completing technical and engineering certificate programs earned about 11.5 academic credits, and like health program completers, earned a relatively high number of these credits in mathematics and science. Even though certificate programs are by design shorter and require fewer credits, there was still a pattern of taking related academic coursework in certain fields of study.

Credits Received by Students Completing Vocational Programs: 1980 Versus 1972

On average, students who graduated from high school in 1980, and completed a vocational A.A. degree program of study within 4 years of graduation, earned more vocational credits in their programs than did similar students who graduated in 1972 (see

Table 11.--Average number of vocational, academic, and remedial credits earned by 1980 high school graduates completing certificates as of 1984, by area of study

Area of study	Sample size*	Total credits	Vocational credits					Academic credits				
			Total vocational credits	Credits in major area	Credits in other vocational areas: Business & marketing	Credits in other vocational areas: Trade & industry/ technical/ engineering	Credits in other vocational areas: Other	Total academic credits	Math & science	Letters	Other academic	Remedial/ avocational
Total	207	39.3	25.7	21.1	3.0	1.6	1.5	11.9	4.2	2.5	5.1	1.5
Business	59	35.1	22.0	17.6	1.4	2.0	1.0	11.4	2.2	3.2	6.0	1.6
Health	40	47.6	32.5	26.1	2.9	0.2	3.3	14.1	6.8	2.6	4.7	1.1
Trade & industry	57	28.2	22.9	20.9	0.8	0.4	0.8	4.2	2.0	1.1	1.1	0.7
Technical/ engineering	31	41.7	27.3	19.1	5.5	2.5	0.2	11.5	6.3	2.3	2.8	2.3

* Sample size on which estimate is based.

NOTE: A fair number of proprietary and technical schools do not give or report credits or grades. Because a substantial proportion of the certificates are awarded by these types of institutions, credits received by certificate completers might be understated. Thus, caution should be exercised when interpreting data pertaining to the credits received by certificate completers. Because of rounding, details may not add to totals.

SOURCE: U.S. Department of Education, National Center for Education Statistics, "High School and Beyond Postsecondary Education Transcript Study."

table 12). Specifically, 1980 graduates earned an average of 39.7 credits in vocational courses, as compared with the 36.5 credits in vocational courses earned by 1972 high school graduates. While 1980 graduates earned more total vocational credits, they did not earn significantly more credits in their major areas of study. However, they earned significantly fewer academic credits.

The pattern of credits earned in vocational courses by students completing certificate programs are somewhat different from the pattern of credits earned by vocational A.A. degree completers. High school seniors in 1980 who went on after graduation to complete a certificate program did not earn significantly more vocational credits or significantly more credits in their major fields of study than did high school seniors in 1972. Graduates in each of these years who went on to complete a certificate program earned the same number of academic credits (11.9 credits, on average) and about the same number of credits in such individual academic subject areas as mathematics, science, and letters.

Credits Received by Students Completing Academic A.A. Degrees

Table 13 presents information on the distribution of credits for students who completed academic A.A. degrees. The average high school graduate in 1980 who earned an academic A.A. degree within 4 years of high school graduation completed almost 76 hours of coursework toward his or her degree, only slightly more than the 71.8 credits received by students who completed vocational A.A. degree programs. Of the total credits a student received, about 58 credits were in academic subjects and 13.6 credits were in vocational subjects. The remaining 4.3 credits were in remedial or avocational courses.

Social science courses were the most popular among academic A.A. degree completers, representing, on average, almost one-fifth (18.9 percent) of all credits earned--due in part to the relatively large number of social science majors. The next most popular areas were the humanities, sciences, and letters. Relatively few credits (6.7 credits) were earned in mathematics, and still fewer in foreign languages (2.7 credits).

The pattern of academic credits varies by field of study. Those students with degrees in humanities received 22.8 credits, or about 35 percent of their total credits, in humanities courses. Social science majors received 26.4 credits (34 percent) in social science courses. Students who earned degrees in liberal/general studies received their credits from a wide range of subject areas. Liberal/general studies students earned

Table 12.--Average number of vocational, academic, and remedial credits earned by high school graduates completing postsecondary credentials within 4 years of graduation, by type of credential and by year of graduation

Type of credential/ year of graduation	Sample size*	Total credits	Vocational credits					Academic credits				Remedial/ avocational
			Total vocational credits	Credits in major area	Credits in other vocational areas: Business & marketing	Credits in other vocational areas: Trade & industry/ technology & engineering	Credits in other vocational areas: Other	Total academic credits	Math & science	Letters	Other academic	
Vocational A.A. degree												
1980 1/	428	71.8	39.7	28.0	6.0	5.0	3.3	29.3	10.2	6.8	12.3	2.5
1972 2/	569	73.6	36.5	26.1	4.4	3.5	4.1	33.9	11.0	7.5	15.5	2.9
Certificate												
1980 1/	207	39.3	25.7	21.1	3.0	1.6	1.5	11.9	4.2	2.5	5.1	1.5
1972 2/	307	35.7	22.4	18.8	1.2	1.6	1.4	11.9	3.9	2.4	5.6	1.1

* Sample size on which estimate is based.

NOTE: Because of rounding, details may not add to totals.

SOURCE: 1/U.S. Department of Education, National Center for Education Statistics, "High School and Beyond Postsecondary Postsecondary Education Transcript Study."
2/U.S. Department of Education, National Center for Education Statistics, "NLS-72 Postsecondary Education Transcript Study."

Table 13.--Average number of academic, vocational, and remedial credits earned by 1980 high school graduates completing acdemic A.A. degrees as of 1984, by area of study

Area of study	Sample size*	Total credits	Academic credits: Total academic credits	Letters	Foreign language	Humanities	Science	Math	Social science	Liberal/ general studies	Vocational credits: Total vocational credits	Business & marketing	Trade & industry/ technical/ engineering	Other	Remedial/ avocational
Total	246	76.0	57.9	10.5	2.7	12.1	11.1	6.7	14.4	0.6	13.6	4.3	3.4	5.9	4.3
Humanities	37	71.9	53.5	9.2	1.6	22.8	5.6	4.9	9.2	0.4	14.1	5.6	2.1	6.4	4.2
Social science	51	77.1	60.0	8.1	1.9	9.3	7.3	6.1	26.4	0.9	13.4	5.7	2.8	5.0	3.6
Liberal/general studies	103	70.2	49.3	9.2	1.2	10.7	10.7	5.7	10.8	1.1	16.4	4.0	5.1	7.3	4.3

* Sample size on which estimate is based.

NOTE: Because of rounding, details may not add to totals.

SOURCE: U.S. Department of Education, National Center for Education Statistics, "High School and Beyond Postsecondary Education Transcript Study."

nearly 11 credits each in the humanities, the sciences, and the social sciences, and 9.2 credits in letters.

Students who earned academic A.A. degrees completed an average of 13.6 credits of coursework in vocational subjects. The most popular vocational areas were business and marketing, with an average of 4.3 credits. Another 1.6 credits were received in trade and industry courses, 1.8 credits in technical and engineering courses, and 1.6 credits in home economics.

Credits Received by Students Completing Academic A.A. Degrees: 1980 versus 1972

Table 14 presents the average number of academic, vocational, and remedial course credits of 1980 and 1972 high school seniors who completed an academic A.A. degree within 4 years of high school graduation. For the most part, the numbers of credits these two groups of students received in their A.A. degree programs are strikingly similar. Seniors in 1980 earned more credits in vocational courses than did seniors in 1972.

Summary

The patterns of vocational credential and academic A.A. degree completions described in the preceding sections are consistent with what is known from annual, national surveys. A larger proportion of students at the pre-baccalaureate level of postsecondary education received some type of vocational credential (vocational A.A. degrees and vocational certificates) than received academic A.A. degrees. Among 1980 high school seniors who completed a postsecondary program within 4 years of high school graduation, vocational credentials were earned at a rate four times that of academic A.A. degrees. The completion rate for vocational A.A. degrees was two-and-one-half times that of academic A.A. degrees. The percentage of high school graduates in 1980 who completed vocational A.A. degree programs was higher than the percentage of high school graduates in 1972 who completed similar programs. On the other hand, fewer 1980 high school graduates completed academic A.A. degree programs[20] than students who graduated from high school 8 years earlier.

Most vocational A.A. degrees were received from public, 2-year colleges, although about 20 percent of the students earned A.A. degrees in vocational areas from 4-year colleges. Six out of every 10 vocational certificate completers earned their credentials from private schools that do not grant bachelor's degrees.

Table 14.--Average number of vocational, academic, and remedial credits earned by high school graduates completing academic A.A. degrees within 4 years of graduation, by year of graduation

Year of graduation	Sample size*	Total credits	Academic credits								Vocational credits	Remedial/ Avocational
			Total academic credits	Letters	Foreign languages	Humanities	Science	Math	Social science	General studies		
1980 1/	246	76.0	57.9	10.5	2.7	12.1	11.1	6.7	14.4	0.6	13.6	4.3
1972 2/	431	74.2	58.7	10.6	3.4	12.6	11.3	5.6	14.7	0.4	11.1	4.2

* Sample size on which estimate is based.

NOTE: Because of rounding, details may not add to totals.

SOURCE: 1/U.S. Department of Education, National Center for Education Statistics, "High School and Beyond Postsecondary Education Transcript Study."
2/U.S. Department of Education, National Center for Education Statistics, "NLS-72 Postsecondary Education Transcript Study."

One of the most consistent patterns in the data is also one of the most familiar. Family socioeconomic factors were related to the types of postsecondary institutions students attended and to the kinds of postsecondary credentials students received. Whether family socioeconomic status is measured by parents' education or an overall socioeconomic status index, the data suggest that students from the highest status families are more likely to attend 4-year colleges and to receive B.A. degrees than those from lower status families. Students from these families, the data suggest, are more likely to attend public 2-year colleges and to receive pre-bachelor's vocational credentials, including vocational A.A. degrees and certificates. However, there is no strong relationship between completion of an academic A.A. degree and a student's socioeconomic status.

Students who attended 4-year colleges were different in several ways from students who attended 2-year institutions or private, non-bachelor's degree-granting institutions. They had higher grade averages; scored higher on tests designed to measure cognitive growth; participated in an academic rather than a vocational high school program; and had higher educational aspirations.

Students who participated in a high school vocational program, and those whose educational aspirations while in high school did not include 4-year college attendance/completion, were more likely to attend public, 2-year colleges and private, non-bachelor's degree-granting schools than 4-year colleges. These students were also much more likely to complete a vocational credential within 4 years of high school graduation than were academic students and 4-year college aspirants.

The most common field of study for vocational A.A. degree and certificate completers alike was business. Roughly one-third of the members of each of these groups earned their credentials in business. Technical and engineering studies and health were the second- and third-most common areas in which vocational A.A. degrees were awarded, while trade and industry and health followed business as the most common areas of study for certificate completers.

Among those students who received vocational A.A. degrees or certificates, there were many differences between the areas of study in which men and women concentrated. Men were more likely than women to earn A.A. degrees and certificates in technical and engineering programs, while women were more likely to complete A.A. degree and certificate programs in business and health.[21]

The credits accumulated by students completing postsecondary vocational credentials suggest that, at least for completers, certain characteristics of postsecondary programs seem consistent with their purpose. A pattern of complementary course-taking emerges where, for example, students completing A.A. degrees in technical and engineering and health fields took more math and science courses than did students majoring in other fields. Overall, fully two-fifths of all credits were earned in academic areas, suggesting that the vocational A.A. degree is not, in general, a narrowly defined program with only vocational coursework.

The credits earned by students completing certificate programs varied markedly from those earned by students completing vocational A.A. degree programs. Students with certificates received a little more than one-half as many credits as students completing vocational A.A. degrees. Consistent with the intention of most certificate programs, the difference comes not as much in the credits students earned in their major field of study, but in less coursework in ancillary vocational areas and especially in academic subjects. Although students receiving certificates still took related academic courses, they earned fewer academic credits, as compared with students receiving vocational A.A. degrees. Thus, certificate programs seem more narrowly focused on vocational objectives and content than vocational A.A. programs.

On average, students who earned academic A.A. degrees received about three-quarters of their credits in academic courses and nearly one-quarter of their credits in vocational subjects. Those who majored in a specific subject area seem to have earned about one-third of their credits in their majors. In contrast, students earning a degree in liberal/general studies earned credits in a broad range of subjects with no apparent tendency to specialize in one area or another.

Although 1980 high school graduates who completed vocational A.A. degree programs earned more vocational credits than did 1972 high school graduates, they did not earn more credits in their major areas. The postsecondary credit patterns for completers of vocational certificate programs and academic A.A. degree programs have not changed much from the early to middle 1970s to the early to middle 1980s.

Technical Notes

Data Sources

All estimates in this report are based on data from two longitudinal surveys conducted by the National Center for Education Statistics. Estimates pertaining to 1980 high school seniors are derived from data collected from the senior cohort of the High School and Beyond study (HS&B). Estimates pertaining to 1972 high school seniors are based on data from the National Longitudinal Survey of the Class of 1972 (NLS-72).

Estimates of the postsecondary education experiences (e.g., credentials received, fields of study, credits earned, etc.) of 1980 and 1972 high school graduates are based on transcript data from the "HS&B Postsecondary Education Transcript Study" and the "NLS-72 Postsecondary Education Transcript Study," respectively. Data on selected student characteristics of 1980 high school graduates come from the HS&B base year (1980), first (1982), and second (1984) followup surveys.[22]

Definition of Vocational and Academic Courses and Credits

Postsecondary courses and credits are classified into 10 vocational areas and 7 academic areas, with the remaining courses classified as remedial/avocational. Appendix A outlines the courses that are included in each area according to the standard CIP (Classification of Instructional Programs) codes used to classify courses and programs for the HS&B and NLS-72 postsecondary transcript studies.

In counting the number of credits a student earns in vocational and academic courses or programs, only credit courses and courses with passing grades were included. Because the number of credits reported in student transcripts was sometimes unbelievably high, certain adjustments were made to the data prior to including them in the analysis. A visual inspection of all courses for which six or more credits were reported (together with information on the type and length of term, the type of institution, and other courses reported at the same time) suggests that in most cases, transcripts with large numbers of credits for individual courses reported hours rather than credits. Consequently, where necessary, the credits reported in the tables have been adjusted to convert hours to the appropriate number of credits a student is expected to have earned during the time reported. A small percentage of courses (less than 1 percent) reported on student transcripts was adjusted in this manner.

Although the average number of credits earned per course, or per term, by full-time students under semester, trimester, and quarter systems were about the same, students on quarter and trimester systems earned about 50 percent more credits over the school year than students on a semester system. To compensate for this difference, all credits received in quarter and trimester systems were multiplied by two-thirds in order to make them more comparable to semester credits. However, for variable length terms--which were most common in trade and technical schools, and in vocational rather than academic programs--there is not enough information on the intensity of course-taking to make an equivalent transformation. Therefore, data on credits reported by these types of institutions were used without any adjustment for term type.

Accuracy of Estimates

The estimates in this report are derived from a sample and are subject to two broad types of error--sampling and nonsampling errors. Sampling errors occur because the data are collected from a sample of population rather than from a census of the population. Nonsampling errors, on the other hand, are not limited to sample surveys but are also found in census surveys.

Nonsampling errors come from a variety of sources: inability to obtain complete information from all students selected to participate in the survey (for example, some students or their schools refuse to participate or students participate but do not answer all questions); ambiguous definitions; differences in the way respondents interpret questions; inability or unwillingness of respondents to give correct information; mistakes in recording or coding data; and other errors which arise when collecting and processing survey data.

Because the HS&B and NLS-72 samples were large, sampling errors were generally small and were not the primary concern. However, when estimates were made for relatively small subpopulations, sampling errors can be more substantial.

In general, it is very difficult to identify and estimate the amount of nonsampling error associated with survey data. However, efforts were made to reduce and compensate for nonresponse bias. The weights used to calculate the estimates reported in the tables were adjusted to compensate for instrument (unit) nonresponse. Investigations of the magnitude of school- and student-level nonresponse bias, in both the HS&B and NLS-72 show the effects of nonresponse to be small (see "Bias Resulting from School Nonresponse: Methodology and Findings," by S.R. Williams and R.E. Folson, Jr., Research Triangle Institute, 1977; and "High School and Beyond First Follow-Up Sample Design

Report," by R. Tourangeau, H. McWilliams, C. Jones, M. Frankel, and F. O'Brien, National Opinion Research Center, 1983).

Methodology and Statistical Procedures

The findings in this report were descriptive or comparative. The descriptive statistics in the tables of the report are expressed as point estimates of means or percentages, weighted to compensate for the sampling design.

The descriptive comparisons in the text of the report are included because they are of substantive interest and because the differences in means or percentages seem to be of practical importance. A test of significance is performed to avoid reporting differences that might be due to sampling variation rather than to differences in the population of students.

Differences in two estimated percentages (means) are tested using Student's t statistic.[23] Student's t values were computed using the following formula:

$$t = \frac{P_1 - P_2}{(SE_{P_1}^2 + SE_{P_2}^2)^{1/2}}$$

where P_1 and P_2 are the two estimates being compared and SE_{P_1} and SE_{P_2} were the corresponding standard errors of the estimates.

Both the HS&B and NLS-72 samples, while representative and statistically accurate, are not simple random samples. Students in both surveys were selected within schools grouped by strata. Sampling rates for schools within different strata differ, resulting in better data for policy purposes, but at a cost of statistical efficiency. As a result, simple random sample techniques for estimating standard errors frequently underestimate the true standard errors. To overcome this problem, the standard errors for all estimates used to compute Student's t values were calculated using Taylor residual techniques.

Unless otherwise stated, all differences highlighted in the text of the report have a t value above 1.95, indicating that it is unlikely that the population group comparison would show no difference. The report contains the t value for each significant comparison, along with its associated probability. All Student's t tests were performed with $n_1 + n_2 - 2$ degrees of freedom.

Table 15 contains the standard errors for a selected set of percentages in the report.[24] Standard errors in the table were calculated with Taylor residual techniques. The standard errors for other percentages in the tables of the report may be approximately estimated by the following formula:

$$SE_p = DEFT * [(P * (100-P))/n]^{1/2}$$

where P is equal to the estimated (weighted) percentage reported in the table and n is the number of observations on which the percentage is based. DEFT is the root design effect. For the NLS-72 transcript study, a 1.2 root design effect may be used to estimate conservatively the effects of the sample design on simple random sample standard errors. A root design effect of 1.7 will serve the same purpose for the HS&B postsecondary transcript study.

As stated previously, tables in the report contain point estimates of percentages and means (averages). The estimates, together with their standard errors, may be used to define confidence intervals, or interval estimates (i.e., ranges that would include the comparable complete-coverage value for a specified percentage of all possible samples). For example, the complete-coverage value would be included in the range of about two standard errors above to about two standard errors below the estimate for approximately 95 percent of all possible samples.

A Word of Caution About Multiple Tests

There were potential hazards associated with performing and/or reporting statistical tests for multiple simple comparisons. First, the test may make comparisons based on large t statistics appear to merit special attention. This can be misleading, because the magnitude of the t statistic is related to both the differences in means or percentages and to the number of students on which the specific comparison is based. Hence, a small difference compared across a large number of students could produce a large t statistic, while a large difference compared across a relatively small number of students could produce a smaller t statistic.

A second hazard relates to the chances that the t statistic will give a misleading result. As the number of comparisons which were made increases, it becomes increasingly likely that at least one of them will give a misleading result. When there is really no difference between the means or percentages being compared, there is still a 5 percent chance of getting a t value of 1.96 from sampling error alone. Although this 5 percent risk seems acceptable for a single t test, the risk of getting at

Table 15. Estimated percentages, standard errors, and unweighted n's for the distribution of area of study for 1980 high school graduates completing vocational A.A. degrees, by selected student characteristics

Student characteristic		Area of Study									
		Agric	Bus	Mktg	Health	Home Ec	Trade Industr	Tech Eng	Educ	Public Service	Design
Total		4.43	34.62	6.30	12.67	1.77	4.12	25.66	6.31	3.16	0.97
	s.e.	1.249	2.988	1.630	2.205	0.798	1.046	3.067	1.404	1.078	0.337
	unwt n	428	428	428	428	428	428	428	428	428	428
Gender											
Male		7.90	22.32	3.44	3.70	1.51	6.31	48.90	2.24	2.94	0.72
	s.e.	2.516	4.566	1.959	1.898	1.366	2.126	5.441	1.444	1.467	0.430
	unwt n	170	170	170	170	170	170	170	170	170	170
Female		2.13	42.76	8.20	18.60	1.94	2.66	10.28	9.00	3.30	1.13
	s.e.	1.224	3.962	2.325	3.402	0.962	0.990	2.498	2.117	1.501	0.484
	unwt n	258	258	258	258	258	258	258	258	258	258
Race/ethnicity											
Hispanic		0.00	47.37	3.96	19.70	3.40	6.60	10.49	5.99	2.48	0.00
	s.e.	0.000	10.769	1.872	10.787	1.898	3.308	4.438	4.277	1.258	0.000
	unwt n	61	61	61	61	61	61	61	61	61	61
Black		0.00	44.64	4.84	8.23	1.06	7.33	19.44	3.86	4.32	6.27
	s.e.	0.000	6.475	2.493	6.233	1.056	3.279	5.164	2.778	2.547	3.124
	unwt n	61	61	61	61	61	61	61	61	61	61
White		5.00	33.25	6.62	12.75	1.77	3.58	26.89	6.50	3.07	0.56
	s.e.	1.407	3.336	1.831	2.349	0.894	1.142	3.410	1.625	1.199	0.288
	unwt n	286	286	286	286	286	286	286	286	286	286
Parents' education											
Less than h.s.		0.00	42.45	0.00	16.85	0.00	6.94	16.93	13.69	0.75	2.38
	s.e.	0.000	13.142	0.000	10.730	0.000	3.245	10.801	10.281	0.197	2.410
	unwt n	36	36	36	36	36	36	36	36	36	36
H.S only		2.71	44.48	7.29	9.31	1.87	4.35	24.87	2.05	3.06	0.00
	s.e.	0.724	5.645	3.280	3.529	0.823	2.161	5.605	1.775	1.955	0.000
	unwt n	124	124	124	124	124	124	124	124	124	124
Some college		6.83	24.85	5.71	16.31	0.11	5.30	28.66	8.48	1.82	1.93
	s.e.	2.788	4.538	2.620	4.073	0.112	2.053	4.821	2.885	1.331	0.786
	unwt n	150	150	150	150	150	150	150	150	150	150
BA/BS/adv degree		3.69	37.46	7.37	8.68	4.45	1.74	23.98	6.63	5.60	0.39
	s.e.	1.999	6.048	3.343	3.523	2.794	0.808	5.724	3.280	2.864	0.398
	unwt n	113	113	113	11 3	11 3	113	11 3	11 3	11 3	113

least one t value of 1.96 in a series of t tests goes up rather dramatically. For example, the risk of getting one misleading t score grows to 23 percent with five t tests; for 10 t tests, it grows to 40 percent; and for 20 t tests, the risk of getting one t value of 1.96 from sampling error increases to 64 percent. The risk of finding a significant t score as a result of sampling error alone decreases for t scores greater than 1.96.

End Notes

[1] National Center for Education Statistics, The Condition of Education, 1987 Edition:120-121.

[2] National Center for Education Statistics, The Condition of Education, 1987 Edition:102-103.

[3] W. Norton Grubb, "The Bandwagon Once More: Vocational Preparation for High-Tech Occupations," Harvard Educational Review 54 (November 1984):429-451.

[4] The fact that students are completing vocational A.A. degrees in greater numbers than in the past may be a result of a greater acceptance of the vocational A. A. degree as a transfer credential.

[5] National Center for Education Statistics, Digest of Education Statistics 1987:215.

[6] For the high school class of 1972, only 57 percent of those completing B.A. degrees within 12 years of graduating from high school did so within 4 years. See "Completion Time for Bachelor's Degrees," U.S. Department of Education, Office of Educational Research and Improvement Bulletin, November 1986.

[7] It is important to note that the denominators of all percentages in table 1 through 4 are the numbers of high school graduates who have any postsecondary education, rather than the numbers of total high school graduates. In addition, the total percentage of students earning any vocational credential (11.6 percent) and the percentage earning a vocational A.A. degree (8 percent) reported in tables 2 and 3 is larger than the percentage of the students earning any vocational credential (11.1 percent) or vocational A.A. degree (7.5 percent) across all types of schools reported in table 1. The percentages reported in tables 2 and 3 include a small number of students who had earned vocational credentials for whom no information was available on the type of school that awarded the credentials. These students are not included in the table 1 statistics.

[8] A very small number of academic certificates was reported in the transcripts, usually for foreign languages; these academic certificates have been eliminated in analyses because the small numbers make any analysis of academic certificates uncertain.

[9] The institutions included in tables 1 through 3 as private, non-bachelor's degree-granting schools include private trade and technical schools (including proprietary schools) which typically grant certificates but which sometimes give A.A. degrees, and private 2-year colleges which may grant A.A. degrees (usually academic) but not bachelor's degrees.

[10] For a discussion of the use of student, self-reported high school programs see E. Gareth Hoachlander and Susan Choy, Classification of Secondary Vocational Education Courses and Students, MPR Associates for the Center for Education Statistics, November 14, 1986, LSB-87-11-14; Robert Meyer, "An Economic Analysis of High School Education," Table 5; in National Commission for Employment Policy, The Federal Role in Vocational Education: Sponsored Research, Special Report No. 39, November 1981.

[11] $X^2 = 7.86$, $p < .10$.

[12] $X^2 = 7.53$, $p < .10$.

[13] $X^2 = 7.55$, $p < .10$.

[14] $t = 1.85$, $p < .10$.

[15] $t = 1.80$, $p < .10$ and $t = 1.78$, $p < .10$, respectively.

[16] The t-value for students who scored lowest versus those who scored in the third quartile is significant at the $p < .10$ ($t = 1.77$) level.

[17] $t = 1.76$, $p < .10$.

[18] The average numbers of vocational credits in students' majors and other vocational areas in the total line of tables 10 through 12 do not add to the total vocational credits because the credits in other vocational areas are calculated for different samples. For example, the number of other credits in business are calculated for students not majoring in business, and the other credits in health are calculated for students not majoring in health, etc.

[19] A fair number of proprietary schools or technical institutes do not give or report credits or grades. Consequently, credit and course data for students who attended these types of schools can be artifically low compared to the number of courses actually taken or attempted. Because a large proportion of the students who complete certificate programs do so in these types of institutions, caution should be used when interpreting the credits earned by certificate completers. No similar problem exists for A.A. degree completers because most 2-year colleges award credits and grades.

[20] It is possible that the differences cited here have been building over a number of years and may have peaked at an earlier time.

[21] These patterns may help explain the implication that females are more likely than males to receive vocational credentials. Female students earned their credentials in the fields that account for about one-half of all vocational credentials.

[22]This report is based on a much longer set of tabulations of the HS&B and NLS-72 survey data prepared by MPR Associates for the Longitudinal Studies Branch, Education Outcomes Division, National Center for Education Statistics, U.S. Department of Education. The full set of tables is available from the National Center for Education Statistics as "High School and Beyond Tabulation LSB-87-4-7, Postsecondary Credits of 1980 Seniors Completing Vocational Education Associate Degrees or Certificates"; "High School and Beyond Tabulation LSB-87-5-7, The Postsecondary Education of 1980 High School Seniors Completing Academic A.A. Degrees"; "NLS-72 Tabulation LSB-87-06-23, Postsecondary Education of 1972 Seniors Completing Postsecondary Vocational Programs"; and "NLS-72 Tabulation LSB-87-06-24, The Postsecondary Education of 1972 Seniors Completing Academic A.A. Degrees."

[23]For some comparisons of subpopulation percentages (proportions), a chi-square test of homogeneity is used instead of Student's t. All chi-square tests are calculated on weighted data adjusted by the mean weight (weighted data sum to the unweighted sample size). Moreover, chi-square values are adjusted by the average design effect for the particular comparisons being made.

[24]Standard errors for all report estimates calculated using Taylor residual techniques are available from the National Center for Education Statistics.

APPENDIX

Classification of Postsecondary Courses

The following classification groups courses, described in the HS&B transcripts by a six-digit CIP code, into ten vocational areas, seven academic areas, and remedial/avocational.

I. Vocational Courses

1. Agriculture
   - Agribusiness and agricultural production 010101 - 019999
   - Agricultural sciences 020101 - 029999
   - Renewable natural resources 030101 - 039999

2. Business and management
   - Business and management 060101 - 069999 except insurance and risk management, (060801), marketing management and research (061401-061499), real estate (061701-061799), small business management (061801-061899)
   - Business and office 070101 - 079999
   - Law 220101 - 220199

3. Marketing and distribution
   - Marketing and distribution 080101 - 089999
   - Insurance and risk management 060801
   - Marketing management and research 061401 - 061499
   - Real estate 061701 - 061799
   - Small business management 061801 - 061899
   - Advertising 090201
   - Communications research 090301
   - Public relations 090501

4. Health
   - Allied health 170101 - 179999
   - Health sciences 180101 - 189999

5. Occupational home economics
   - Home economics 190101 - 199999
   - Vocational home economics 200101 - 209999

6. Trades and industry
   - Industrial arts 210101 - 210199
   - Construction trades 460101 - 469999
   - Mechanics and repairers 470101 - 479999
   - Precision production 480101 - 489999
   - Personal services 120101 - 129999
   - Transportation and material moving 490101 - 499999
   - Communications, general and other 090101, 099999
   - Journalism 090401
   - Radio/television news broadcast and general 090601 - 090701

7. Technical and engineering
   - Computer and information sciences 110101 - 119999
   - Engineering 140101 - 149999
   - Engineering and engineering-related technologies 150101 - 159999
   - Engineering and other studies 300301
   - Systems science 300601
   - Science technologies 410101 - 419999
   - Communication technology 100101 - 100199

8. Education and library science
   - Education 130101 - 139999
   - Library science 250101 - 259999

9. Public service
   - Protective services 430101 - 439999
   - Public affairs 440101 - 440301, 440601 - 449999
   - Military science 280101 - 289999
   - Military technologies 290101 - 290199
   - Parks and recreation 310101 - 319999
   - Public administration 440401

10. Design and applied arts
    - Architecture and environmental design 040101 - 049999
    - Visual and performing arts 500101-500699, 500801
    - Arts management 500704

II. **Academic**

1. Letters 230101 - 239999

2. Foreign languages and area studies
   - Foreign languages 160101 - 169999
   - Area studies 050101 - 050199

3. Humanities
   - Philosophy 380101 - 389999
   - Theology 390101 - 399999
   - History 450801
   - Humanities and social sciences 300401
   - Peace studies 300501
   - Art and art history 500701-500703, 500705 - 500799
   - Music 500901 - 500999, 509999

4. Sciences
   - Life sciences 260101 - 269999
   - Biological and physical sciences 300101
   - Physical sciences 400101 - 409999

5. Mathematics 270101 - 279999

6. Social sciences
   Psychology 420101 - 429999
   Clinical pastoral care 300201
   Social sciences (except history)
     450101 - 450701, 450901 - 459999
   Public affairs 440501
   Ethnic studies 050201 - 059999
   Women's studies 300701

7. Liberal studies/general studies 240101, 240199, 309999

III. **Remedial/Avocational**

Basic skills 320101 - 320199
Citizenship 330101 - 330199
Health-related 340101 - 340199
Interpersonal skills 350101 - 350199
Leisure and recreational activities 360101 - 360199
Personal awareness 370101 - 370199

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